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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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07/11/2001

Christopher S. Chen

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21874

7590

07/24/2007

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EXAMINER

NAFF, DAVID M

ART UNIT

PAPER NUMBER

1657

MAIL DATE

DELIVERY MODE

07/24/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 09/904,200	Applicant(s) CHEN ET AL.	
	Examiner David M. Naff	Art Unit 1657	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 64-68, 70-80, 83-92, 94 and 95 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 64-68, 70-80, 83-92, 94 and 95 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible
5 for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

Applicant's submission filed on 5/1/07 has been entered.

An amendment file 5/1/07 amended claims 64 and 95.

10 Claims examined on the merits are 64-68, 70-80, 83-92, 94 and 95, which are all claims in the application.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

15 The following is a quotation of the first paragraph of 35 U.S.C. 112:

20 The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 64-68, 70-80, 83-92, 94 and 95 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written
25 description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the

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time the application was filed, had possession of the claimed invention.

Adequate support is not found in the specification for the surfactant being directly adsorbed on the polymeric surface as now required in claims 64 and 95. The specification fails to recite "directly" adsorbed. While the portions of the specification applicants cite for support disclose adsorbing the surfactant onto the surface and onto hydrophobic regions, there is no disclosure that this adsorption is intended to be "direct", and that direct adsorbing is to be a limitation of the present invention. In view of Figure 2, the invention appears to encompass an embodiment where a hydrophilic surface is rendered hydrophobic with a hydrophobic SAM so the surfactant will adsorb. In this embodiment, adsorption of the surfactant (PEO) is not direct since the surface has been provided with a SAM of a hydrophobic thiol prior to adsorption of the PEO.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 64-68, 70-80, 83-92, 94 and 95 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 64 and 95, "adsorbed directly on the polymeric surface" is uncertain as to meaning and scope. The specification does not recite and define "adsorbed directly". It would be uncertain as to when adsorption of the surfactant to the surface is direct and not direct. Would adsorption to the surface be direct or indirect when the surface has been modified to contain a hydrophobic SAM as in Figure 2? This could be considered indirect adsorption of the surfactant to the surface. Alternative to a hydrophobic SAM, the surface could be modified with other hydrophobic groups.

Claim Rejections - 35 USC § 103

Claims 64-68, 70-80, 83-92, 94 and 95 are rejected under 35 U.S.C. 103(a) as being unpatentable over Singhvi et al (6,368,838 B1) in view of Dewez et al (WO 96/15223) and Anderson et al (6,686,184 B1) for reasons in the previous office action of 12/14/06.

The claims are drawn to a device containing a substrate comprising a polymeric surface having thereon a plurality of cytophilic regions that can adhere biomolecules and cytophobic regions to which the biomolecules do not adhere, and the cytophobic regions are formed by a surfactant compound adsorbed directly on the polymeric surface. The polymeric surface may comprise microfluidic channels.

Singhvi et al disclose a device having cytophilic islands for adhering cells and cytophobic regions which isolate the cytophilic islands. The cytophilic islands may contain extracellular matrix proteins (col 9, lines 32-33) to promote binding of cells (col 9, lines 22-26).

Dewez et al disclose a biomaterial for selective adhesion of cells or tissue which contains a polymeric support having a heterogeneous surface conditioned with a surfactant and an extracellular matrix protein. The extracellular matrix protein adheres to one surface area of the support and the surfactant adheres to another surface area where it inhibits adsorption of the extracellular matrix protein (paragraph bridging pages 3 and 4). Cells preferentially adhere to the portion of the support containing the extracellular matrix protein (page 4, lines 12-16).

Anderson et al disclose patterning surfaces using a stamp containing microfluidic channels.

It would have been obvious to provide the cytophilic islands of the device of Singhvi et al with extracellular matrix protein to enhance the binding of cells as suggested by Singhvi et al and Dewez et al, and it would have been obvious to provide the cytophobic regions of Singhvi et al with a surfactant to inhibit binding of extracellular matrix protein to these regions as suggested by Dewez et al. It would have been further obvious to provide the device of Singhvi et al with microfluidic channels to obtain the function of these channels in patterning a surface as disclosed by Anderson et al since the device of Singhvi et al can be used for patterning a surface as shown by Figure 1. If adsorbing PEO to a hydrophobic SAM as shown by Figure 2 of the present specification is considered by applicants to be direct adsorption, then adsorption of a surfactant to a hydrophobic SAM on the surface of Singhvi et al would also be direct adsorption. Furthermore, it would have been obvious to provide the cytophobic regions of Singhvi et al without using a SAM such as by

using a polymer that is hydrophobic without modification with a SAM. The conditions of dependent claims would have been matters of obvious choice within the skill of the art in view of the disclosures of the references. The surfactant of Dewez et al can be a polyethylene oxide
5 (page 19, 5). Selecting another known surfactant that provides the same function would have been obvious. The devices of Singhvi et al and Dewez et al can have various forms and shapes and to provide channels as claimed by claims 81 and 82 would have been obvious. As to claims 91 and 92, the surface of Singhvi et al can be made of
10 plastic or polysulfone compounds (col 8, lines 44-45). Polysulfones are hydrophobic. Selecting other polymers that provide the same function would have been obvious.

Response to Arguments

15 Applicant's arguments filed 5/1/07 have been fully considered but they are not persuasive.

The amendment urges that Singhvi et al fail to teach cytophobic regions formed with a surfactant compound, but instead disclose cytophilic and cytophobic regions formed of SAMs. However, the
20 present specification discloses (Figure 2), cytophilic and cytophobic regions created with SAMs. The present claims do not exclude the embodiment of Figure 2. While Singhvi et al does not disclose forming cytophobic regions with a surfactant, and forming microfluidic channels, these features of the present invention would have been
25 obvious from the teachings of Dewez et al and Anderson et al.

Applicants urge that there is no teaching in Dewez et al to replace the SAMs with a surfactant. However, it would have been obvious to adsorb a surfactant on a cytophobic SAM or substitute a hydrophobic surfactant for the SAM to prevent extracellular matrix protein from adsorbing on the surface in a similar way that Dewez et al adsorb a surfactant on a hydrophobic surface. Moreover, it would have been obvious to use a surfactant to form a cytophobic SAM since Dewez et al disclose (page 5, lines 16-19) that the surfactant can contain a polyethylene oxide group and Singhvi et al disclose that a biophobic SAM can contain a polyethylene glycol group (col 9, line 60). As to microfluidic channels, it would have been obvious to provide the channels on the surface to obtain the function of the channels as obtained by Anderson et al. The rejection is not based on Singhvi et al alone but on Singhvi et al in combination with Dewez et al and Anderson et al. Since the references are applied in combination, the references disclosing different methods does not make the rejection untenable. The present invention is merely a combination of prior art techniques where each is functioning as would be expected from the teachings of references applied. An unexpected result is not seen in the presently claimed modification of Singhvi et al.

In regard to motivation, when using an extracellular matrix protein for binding cells as disclosed by Dewez et al, one would have been motivated to use a surfactant to inhibit binding of the extracellular matrix protein to certain regions to which cells are to

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be adsorbed. The present specification discloses that extracellular matrix protein can be used as an adhesive to bind cells. For example, see page 9, lines 1-5, and page 13, lines 29-30.

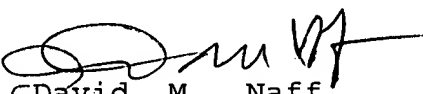
Conclusion

5 Any inquiry concerning this communication or earlier communications from the examiner should be directed to David M. Naff whose telephone number is 571-272-0920. The examiner can normally be reached on Monday-Friday 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful,
10 the examiner's supervisor, Jon Weber can be reached on 571-272-0925. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


David M. Naff
Primary Examiner
Art Unit 1657

DMN

15 7/21/07